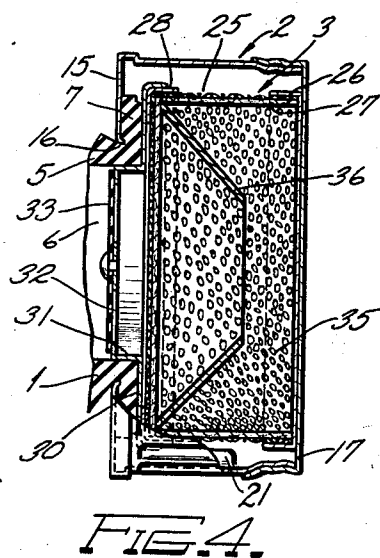
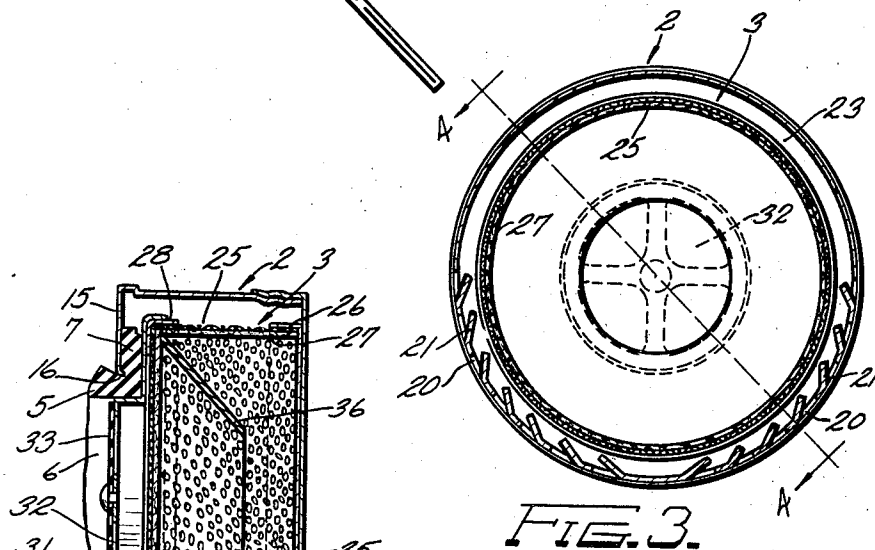
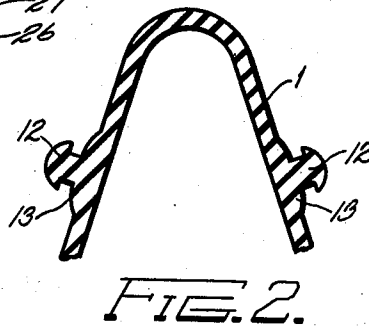
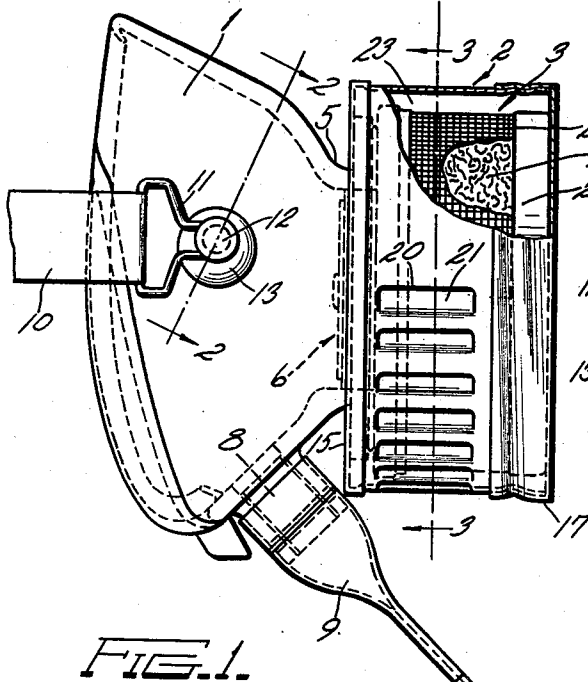


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C. F. SCHMIDT
RESPIRATOR

2,295,296

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Inventor
Charles F. Schmidt

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Attorneys

UNITED STATES PATENT OFFICE

2,295,296

RESPIRATOR

Charles F. Schmidt, Toledo, Ohio, assignor to The De Vilbiss Company, Toledo, Ohio, a corporation of Ohio

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6 Claims. (Cl. 128—146)

This invention relates to improvements in respirators of the type adapted to protect workmen and others from dust, paint spray, smoke and obnoxious gases of various kinds.

The primary object of the invention is the provision of a simple, efficient and improved filter cartridge member whereby to enhance the practicability and commercial value of devices of this type.

Another object of the invention is the provision of simple and novel means for centering the filter cartridge in the outer case and connecting it, the respirator body or face piece and the outer case together in sealed relation.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing illustrating one form of the invention, in which—

Figure 1 is a side elevation of a respirator embodying the invention, with a part broken away; Fig. 2 is a fragmentary sectional detail on the line 2—2 in Fig. 1; Fig. 3 is a cross-section on the line 3—3 in Fig. 1, and Fig. 4 is a central longitudinal section of the device on the line 4—4 in Fig. 3, with parts in full and with a part of the face piece broken away.

Referring to the drawing, 1 designates the separator body or face piece, 2 the filter cartridge containing case, and 3 the filter cartridge.

The face piece 1 is of soft rubber and of a shape and construction to adapt it to fit closely to the face of the wearer in enclosing relation to the mouth and nose, as well understood in the art. The inner end of the face piece, or that away from the face coating portion, is restricted to a circular neck portion 5 forming a throat passage 6 for the inlet of filtered air to the face piece. This neck terminates at its free end in an outwardly projecting radial flange 7. The face piece at one side, the lower in the present instance, is provided with an outlet opening 8 controlled by a flutter valve 9 so as to open only under exhaling action, as well understood in the art.

The face piece 1 is held to the face by a strap 10, having at its ends loops 11 for releasable engagement with buttons 12 on opposite sides of the face piece. It has heretofore been customary to make such buttons of metal and attach them to the rubber material of the face piece in the manner of rivets. Such metal or separate piece buttons have not been satisfactory in use, as it is found that the stresses applied thereto cause them to stretch the rubber of the face piece and either pull out or leave openings therearound for

the admission of unfiltered or untreated air. This objection is overcome by forming the buttons integral with the face piece and of the rubber material of which it is composed. The face piece is preferably reinforced or thickened at the points of projection of the buttons thereover, as shown at 13.

The case 2 is preferably, but not necessarily, of thin metal, for instance aluminum, is cylindrical in form, is larger in diameter than the neck end of the face piece 1 and has its inner end formed with an intumed annular radial flange 15 to provide a centrally disposed receiving opening for the face piece neck. The diameter of this opening is approximately the same as the outer diameter of said neck adjacent to the flange 7 thereof to adapt the neck to be received by the opening with the flange 7 in engagement with the inner marginal edge portion of the case flange 15. It is preferable to provide the flange 15 with an intumed edge lip 16 to facilitate forming a close seal with the face piece flange when clamped thereto. The case 2 is open at its outer end and is adapted to be closed by a screw cover 17.

The circumferential side wall of the case 2 is provided, for a considerable distance therearound, with air inlet openings 20 from one edge wall of each of which louvers 21 preferably project to direct the air in circular courses around the interior of the case. It is found in practice, particularly in connection with paint spraying, that the best results are obtained by disposing the openings 20 in the lower half of the case side wall and to dispose the louvers inwardly and upwardly from the lower edge walls of these openings so that the entering air currents are upward. With this arrangement of louvered openings, the particles of paint residue in the air have a tendency to gravitate to the floor rather than to enter these openings and pass upward within the case.

The filter cartridge 3 is enclosed within the case 2 and is of less diameter than such case to provide an annular air circulating space 23 therebetween and into which exterior air to be treated is admitted through the openings 20. The disposition of the openings 20 and their louvers tends to distribute the indrawn air substantially uniformly around the space 23, the top outer wall portion of which is imperforate.

The cartridge 3 includes a filter cup 25 of fine mesh screen material and sufficiently stiff to normally maintain its shape, and the outer end of this cup is closed by a removable cover 26 of

cardboard or other suitable stiff material. The side wall and bottom or inner end of the screen cup 25 is lined with a layer of porous filtering medium 27, preferably of an absorbent nature, such for instance as gauze faced on one side with cotton of a semi-absorbent nature. This material has a cleaning effect on the air passing there-through and prevents any dust particles in the air from entering the interior of the cartridge.

Fitted over the inner corner edge of the filter cup 25 is an annular sealing strip 28 preferably, but not necessarily, of cardboard, or other stiff paper stock, and angular in cross-section to adapt it to receive and closely fit around the inner corner of the filter cup.

Attached to the inner end of the filter cup 25 is an adapter or inner end plate 30, the outer edge of which is flanged to receive and have clamping engagement with the cup through the medium of the sealing strip 28. This plate has a central cylindrical protuberant portion 31 of a shape and size to fit closely into the throat of the face piece neck 5, so as to frictionally retain the cartridge 3 in connection with such face piece and at the same time provide a centrally exposed uncovered portion of the inner end of the screen cup 25. The outer end of the protuberant portion 31 is provided therethrough with one or more openings 32 to open communication between the interior of the face piece 1 and the interior of the cartridge 3. A flexible valve member 33 is secured to the outer end of the protuberant portion 31 and serves as a check valve for opening and closing the openings 32 during respective inhaling and exhaling actions.

The cartridge cup, interiorly of the porous lining 27, is filled with any suitable material 35 for imparting the desired treatment to the air passing through the cartridge. Such a material found suitable and frequently used for the purpose is activated charcoal. In order to cause the air which passes through the cartridge to take a long course therethrough, so as to have sufficient contact with the treating material to obtain beneficial results, a baffle 36 is secured in the inner end portion of the filter cup. This baffle is preferably of conical shape with its large end fitting against the side wall of the cup at the inner edge thereof, while its small end projects a considerable distance into the cup so that any air entering the cup through its side wall is required to pass to and through the small end of the baffle before discharging from the inner end of the cup through the treating material disposed within the baffle.

The cover 17 of the case, when screwed home thereon, engages the outer end of the cartridge 3 and serves to retain the protuberant inner end part 31 in the face piece throat and to clamp the flange 7 of the face piece between the plate 30 and inner end flange 15 of the case, thus preventing any leakage of air into the face piece through the connection of the cartridge 3 therewith. It is apparent that in the use of the respirator, the face piece 1 is clamped to the face in enclosing relation to the nose and mouth, so that all air of inhalation must first pass through the treating cartridge before entering the face piece, while all exhaled air passes outward from the face piece through the flutter valve 9. All air which enters the case 2 is caused to be circulated around the space 3 therein due to the provision of the louvers 21 and to then flow substantially uniformly through the screened side wall of the cartridge and filtering lining 27 into the interior of the cartridge where it is caused to pass through a consid-

erable portion of the treating material 35 therein, due to the baffle 36, before passing from the inner end of the cartridge through the valve openings 32 into the face piece. It is apparent that the cartridge 3 may be easily and quickly removed for the purpose of cleaning or for repair or replacement of parts.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. In a respirator, a cylindrical case having its outer end closed and its inner end open, a face piece having its inlet throat in connection with the interior of the case through said inner end opening, an air filtering and treating cartridge of cylindrical form mounted in said case with its periphery in spaced relation to the side wall of the case to provide an air space therebetween, said cartridge having its outer end closed and its inner end open to the face piece throat and having its peripheral wall of an air filtering nature, said case, in use, having a portion of its periphery disposed so that substantially half of its peripheral wall faces upwardly and the other half faces downwardly, said lower half having a plurality of louvered openings therein to admit outside air to the space between the case and cartridge with the louvers directed inwardly and upwardly in said space.

2. In a respirator, a face piece having an air inlet throat with an inwardly opening valve, a cylindrical case carried by said throat and, in use, having its peripheral wall disposed with one half facing downwardly and provided with a plurality of openings which are louvered to direct entering air upwardly within the case and with its upper half imperforate, an air filtering and treating cartridge of cylindrical form mounted in said case in substantially coaxial relation thereto with its periphery in spaced relation to the peripheral wall of the case to provide an air space therebetween, said cartridge having its outer end closed and its inner end open to the face piece throat and forming the sole means of communication between said space and the interior of the face piece.

3. In a respirator, a face piece having an inlet throat, a case with an enclosed air filtering cartridge attached to the inlet throat of the mouth piece, said case and cartridge each being of cylindrical form and one disposed within the other with a space between their peripheral walls, said cartridge providing the sole communication between said throat and space, and said case having substantially one half of its side wall facing upward when in use and being imperforate and having the lower half of said wall provided with louvered openings for admitting air upwardly into said space.

4. In a respirator, a case having a centrally disposed opening in its inner end and a removable cover for its outer end, a face piece having its throat engaged within said inner end opening and having an exhaling opening, an outwardly opening check valve for said exhaling opening, an air filtering and treating cartridge engaged to the throat end of said face piece and thereby centered in the case with its side wall spaced from the case side wall to provide an air distributing space therebetween, said car-

tridge including a screen member of cup-form with its closed end adjacent to the face piece, a lining of air filtering material for said screen member, a cover for the outer end of the screen member, an air treating material in said member and a bottom plate for the cartridge partially closing the inner end of the screen member and having a portion with one or more openings therein opening communication between the interior of the cartridge and the face piece, and an inwardly opening check valve normally closing said plate openings, said cartridge forming the sole means for the passage of air from said space to the interior of the face piece, and provision in the case for admitting air to said space.

5. In a respirator, a case having openings in its side portion for admitting air to the interior of the case and having an opening in its inner end, a face piece having its inlet throat in connection with the interior of the case through said inner end opening, an air filtering and treating cartridge mounted in said case with its periphery in spaced relation to the side wall of the case to provide an air space therebetween, said

cartridge forming the sole means of communication between said space and the interior of the face piece, provision at the inner end of said cartridge for admitting inhaled air to the face piece through the cartridge but closing under exhaling pressure, said cartridge having an air treating material therein and having a baffle between its air inlet and outlet portions and within said treating material which causes air to take a relatively long course in its passage through said material.

6. In a respirator, an air filtering and treating cartridge having an air treating chamber therein and having provision for the admission of air to the chamber through its side wall and the exit therefrom through an end wall, a treating material filling said chamber, and a baffle of conical form disposed endwise in said chamber and forming a funnel with its large end at the outer end of said chamber, said baffle causing the passage therethrough of all of the air which passes through the filter.

CHARLES F. SCHMIDT.